



6 STEPS TO AN ENERGY EFFICIENT ADDITION

2nd Edition



Gray Davis, Governor

SEPTEMBER 1999
**CALIFORNIA
ENERGY
COMMISSION**

P400-99-005

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CALIFORNIA ENERGY COMMISSION

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& APPLIANCES OFFICE**

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ENERGY EFFICIENCY DIVISION



- *Save money on your utility bills*
- *Enjoy cooler summers and warmer winters*
- *Increase the value of your home*
- *Comply with the energy code*

How? Just follow the

Six Steps to an Energy Efficient Addition

Special thanks to

Jon Doidge,
Dean Samuelson, and
Christopher Savarino

for their contributions to this publication.

It's a proven fact . . .

Your energy bills will be lower and your home will be more comfortable to live in when you design energy efficient features into your addition.

How do you do this? It's simple--just follow the *Six Steps* outlined below. When you do, you'll comply with California's Energy Efficiency Standards and you'll have a more comfortable and affordable home.

Six Steps:

1. Read the definitions section in this packet for a better understanding of common terms used by building departments and contractors. Look for any obvious problems which would prevent your addition from complying.
2. Determine your climate zone.
3. Identify the energy saving requirements for your addition. (Refer to Table 1, 2, or 3--pages 5-7.)
4. Compare your addition's design with the minimum requirements tables to see if your design meets the energy efficiency requirements of the California Energy Code.
5. Complete the compliance forms required by your building department. (Samples on pages 17 through 20. Blank forms on pages 21-26.)
6. Submit your completed building plans and compliance forms to your local building department. They will check the forms and verify that you install each required energy efficiency feature during their construction inspections of your addition.

Information contained in this pamphlet is based on the Prescriptive Approach for compliance with the energy code. This is the easiest method for determining the requirements for your addition. If your proposed design does not meet all the requirements of this approach, you will need to modify your design or use another compliance method. Staff of the Energy Hotline can answer your questions about any compliance method. To reach the Hotline, call (916) 654-5106 or (800) 772-3300 (toll free in California).



Step 1:

Read the definitions

ADDITION

Any change to a building that increases its conditioned floor area and conditioned volume. Examples of additions include:

- Increasing the floor space of an existing home by adding or enlarging a bedroom, kitchen or bathroom.
- Remodeling a previously unheated space such as a basement, attic or garage to make it a conditioned room (like a den).

CLIMATE ZONES

Geographic regions within California, each having different weather conditions.

CONDITIONED FLOOR AREA

The total floor area (in square feet) of enclosed conditioned space measured from the outside surface of exterior walls.

CONDITIONED SPACE

Enclosed space that is heated by wood, is directly mechanically heated or cooled, or indirectly mechanically heated or cooled.

DUAL GLAZED GREENHOUSE WINDOWS

A type of window that projects out from the building. They add volume but not floor area to a room. They therefore are only alterations, not additions.

ENERGY FACTOR (EF)

The efficiency rating for typical storage water heaters. It's a number with a decimal point, usually listed on a separate tag on the water heater. The higher the Energy Factor, the more efficient the water heater. Gas water heaters range between 0.53 to around 0.78. Electric models range from 0.78 to 0.99.

Note: Even though electric water heaters have high efficiencies it can cost 3 times more to heat your water.

FENESTRATION

(See Windows and Glass Doors)

FLOORS

- **Raised Floors** have unconditioned space, crawlspace or outside air below the floor.
- **Slab-on-Grade** is a concrete slab floor in direct contact with the earth below the building.

HSPF

The **H**eating **S**easonal **P**erformance **F**actor is the heating efficiency measure used for heat pumps. It was designed to allow the consumer to easily compare one heat pump with another. The higher the number the better. The HSPF is found on the yellow EnergyGuide label attached to a new heat pump or by checking the model number with the Energy Hotline. The minimum value for a split system heat pump (one with separate condenser and air handling units) is 6.8. The minimum value for a package system (one that combines both condenser and air handling capabilities in a single unit) is 6.6.

INSULATION

Material that slows heat flow into or out of a home. It is measured in R-value. The higher the R-value of a material, the greater its insulating properties and resistance to heat flow.

MANDATORY MEASURES

Minimum energy design measures that must be followed to comply with the energy code. Mandatory measures along with Climate Zone features help you achieve an optimum level of comfort and efficiency in your home.



R-VALUE

Indicates how well a material prevents heat flow. It is used for comparing insulating characteristics of different materials. The higher the R-value of a material, the greater its insulating capabilities.

SF

Square Feet.

SOLAR HEAT GAIN COEFFICIENT (SHGC)

A measure of the effectiveness of a fenestration product or window covering to stop solar heat gain through the window. Lower numbers indicate less solar heat gain is allowed through the product.

U-VALUE

A measure of heat conductivity of a construction assembly. A construction assembly includes insulation as well as framing. The lower the U-value of an assembly the better it insulates.

WINDOWS AND GLASS DOORS

Any transparent or translucent material plus any sash, frame, mullion, or divider.

Includes, but is not limited to: windows, sliding glass doors, French doors, skylights, curtain walls, and garden windows.



Determine your climate zone

Step 3:

Determine the energy saving requirements for your addition

Select the table that most closely corresponds with the size of your proposed addition.

After finding the appropriate Table go to step 4.

- **Table 1** - Additions with new floor area of less than 100 square feet (sf).
Note: Additions of less than 100 sf. can select from Table 1 or Table 2.
- **Table 2** - Additions with new floor area of less than 1,000 sf.
- **Table 3** - Additions equal to or greater than 1,000 sf.

Table 1

Minimum requirements for additions less than 100 sf.	
Climate Zone	All Climate Zones
Insulation R-values (Minimum)	
Ceiling	19
Wall	13
Raised Floor	13
Windows and Glass Doors (Maximum)	
U-value	0.75
Maximum area	50 sf.
Space Heating	
Space heating equipment must comply with applicable appliance efficiency requirements. See the Space Heating section.	
Space Cooling	
Space cooling equipment must comply with applicable appliance efficiency requirements. See the Space Cooling section.	
Water Heating	
If # of water heaters increases:	See Water Heating Section



Table 2

Minimum requirements for additions of less than 1000 sf.									
Climate Zone	1	2	5	12	3,4,6,7	8,9,10	11,13,14	15	16
Insulation R-values (Minimums)									
Ceiling	38	30	30	38	30	30	38	38	38
Wall	13	13	13	13	13	13	13	13	13
Below Grade Wall	NA	NA	NA	NA	NA	NA	NA	NA	13
Slab Edge Insulation	NA	NA	NA	NA	NA	NA	NA	NA	7
Raised Floor	19	19	19	19	19	19	19	19	19
Concrete Raised Floor	8	8	NA	4	NA	NA	8	4	8
Windows and Glass Doors (Maximums)									
U-value for additions less than 500 sf.	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
U-value for additions greater than or equal to 500 sf.	0.65	0.65	0.75	0.65	0.75	0.75	0.65	0.65	0.60
Percent of glass allowed in addition Plus area removed.	16%	16%	16%	16%	20%	20%	16%	16%	16%
Solar Heat Gain Coefficient (Maximums)									
South Facing Glass	NA	NA	NA	NA	NA	NA	NA	0.40	NA
West Facing Glass	↓	↓	↓	0.40	↓	0.40	0.40	0.40	↓
East Facing Glass	↓	↓	↓	0.40	↓	0.40	0.40	0.40	↓
North Facing Glass	↓	↓	↓	NA	↓	NA	NA	NA	↓
Space Heating For All Climate Zones									
Space heating equipment must comply with applicable appliance efficiency requirements. See Space Heating section.									
Space Cooling For All Climate Zones									
Space cooling equipment must comply with applicable appliance efficiency requirements. See Space Cooling section.									
Water Heating									
Increase in # of water heaters:					See Water Heating Section				

Note: NA = Not Applicable



Table 3

Minimum requirements for additions greater than or equal to 1000 sf.										
Climate Zone	1	2	5	3,4,6,7	8,9,10	11,13	12	14	15	16
Insulation R-values (Minimums)										
Ceiling	38	30	30	30	30	38	38	38	38	38
Wall	21	13	13	13	13	19	19	21	21	21
Below Grade Walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	13
Slab Edge Insulation	NA	NA	NA	NA	NA	NA	NA	NA	NA	7
Raised Floor	19	19	19	19	19	19	19	19	19	19
Concrete Raised Floor	8	8	NA	NA	NA	8	4	8	4	8
Windows and Glass Doors (Maximums)										
U-value	0.65	0.65	0.75	0.75	0.75	0.65	0.65	0.65	0.65	0.60
Percent of glass allowed	16%	16%	16%	20%	20%	16%	16%	16%	16%	16%
Solar Heat Gain Coefficient (Maximums)										
South Facing	NA	NA	NA	NA	NA	NA	NA	NA	0.40	NA
West Facing	↓	↓	↓	↓	0.40	0.40	0.40	0.40	0.40	↓
East Facing	↓	↓	↓	↓	0.40	0.40	0.40	0.40	0.40	↓
North Facing	↓	↓	↓	↓	NA	NA	NA	NA	NA	↓
Space Heating For All Climate Zones										
Space heating equipment must comply with applicable appliance efficiency requirements. See Space Heating section.										
Space Cooling For All Climate Zones										
Space cooling equipment must comply with applicable appliance efficiency requirements. See Space Cooling section.										
Water Heating										
Increase in # of water heaters: See Water Heating Section										

Note: NA = Not Applicable



Step 4:

Compare your addition's proposed design with the minimum requirements tables

Now that you know your *Climate Zone* and which *minimum requirements table* to use, you can determine if your proposed design meets or exceeds the minimum requirements.

If your design features do not meet or exceed the efficiency requirements, you must either redesign your addition or utilize another compliance method. For more information on alternative compliance methods contact the Energy Hotline at (916) 654-5106 or (800) 772-3300.

In this step (Step 4), we'll walk you through the procedure to determine if your design meets or exceeds minimum requirements.

On Pages 17 and 18 you will find a sample ***Certificate of Compliance (CF-1RA)*** specifically for additions. We will refer to the sample CF-1RA throughout Step 4. The blanks have been filled in using the following criteria:

- Climate Zone: 12
- Size of addition: 800 sf. slab-on-grade
- Fenestration: 175 sf.
- Fenestration removed: 50 sf.

(Based on the size of our sample addition (800 sf.), we will be using Table 2 for our examples)

To begin your own calculations, complete the blank ***Certificate of Compliance (CF-1RA)*** on Pages 21 and 22. Fill in the following:

- Your Climate Zone
- Your Floor Construction Type
- Conditioned floor area for your addition

INSULATION

To determine if the R-value of your insulation design meets or exceeds the minimum requirements, refer to the Table you selected for your addition. Using the column that corresponds with your Climate Zone, find the required R-value and write that value in the *Min.* column of the *Insulation R-Value* column for floors, walls, and ceilings. Write the R-value of your **design** in the *Insulation R-value installed* column on the CF-1RA. Your installed value must be greater or equal to the minimum value.

Example: Our sample addition will have R-38 in the attic and R-13 in the walls. Referring to Table 2, Climate Zone 12, the R-value listed for *Ceiling* is shown as 38. The R-value listed for *Wall* is shown as 13. We have noted these R-values in the appropriate spaces on the sample CF-1RA.

Remember. These are the minimum values required for the *sample* addition. Once you have found the appropriate R-values for *your* climate zone, compare them with the insulation R-values in your design. If the R-values in your design do not meet or exceed the minimum R-values you've entered on your CF-1RA, then you must upgrade this design feature or try another compliance option.



WINDOWS AND GLASS DOORS

Add up the square footage of the windows, skylights, and glass door area and put that number in *Total Area*.

Begin this section by filling in the *Area* (square footage) of the windows, skylights, and glass doors (by the direction they're facing) and the *Window Type*.

With that completed, you're ready to determine the *U-value* and *Solar Heat Gain Coefficient* requirements for your windows and glass doors.

U-Value

To determine if the U-Value of your window design meets or is lower than the maximum requirements, refer to the Table you selected for your addition. Using the column that corresponds with your Climate Zone, find the appropriate U-value based on the square footage of your addition and place that value in the *Max U-Value* column. Next, enter the installed U-Value in the *Installed U-Value* column.

Example: Referring to Table 2, Climate Zone 12, and the line marked "greater than or equal to 500 sf.," the U-value listed for windows is 0.65. This U-value is entered in the appropriate space on the sample CF-1RA.

Note: If your chosen table lists a U-value of 0.60, 0.65, or 0.75, the following types of windows can be installed:

- any dual pane window or glass door with *non-metal* framing, or
- any dual pane skylight or dual pane greenhouse windows

If your chosen table lists a U-value of 0.75, the following types of windows can be installed (in addition to the windows listed above):

- any metal frame dual pane window that is fixed (non operable), or
- any metal frame dual pane window or glass door that is labeled with the term "thermal break".

Note: When looking for new windows, look for the National Fenestration Rating Council (NFRC) label on the window. This sticker will tell you the tested U-value and SHGC of the window.

Total Window Area

Another part of the window requirement is the amount of glass that can be installed in the addition.

When using Table 1, the maximum amount of glass is 50 sf. with no credit for glass removed. The credit for glass removed, can only be used in additions complying with Table 2 or 3 requirements.

To determine the percentage of allowed glass, refer to the *Percent of glass allowed in addition* line of the Table you selected for your addition. Again, use the column for your Climate Zone. Write the appropriate percentage in the *Allowed Percentage* space on the CF-1RA.

Find the *Total Percentage* by dividing the *Total Area* of your windows by the *Conditioned floor area for this addition* and multiply by 100. Write this number on the *Total Percentage* line.

If windows were removed from a wall that was either removed or altered in order to accommodate the addition, write that square footage in *Area Removed*. Subtract *Area Removed* from *Total Area* to calculate the *Adjusted area*.



WINDOWS AND GLASS DOORS

(Continued)

Find the *Adjusted Percentage* by dividing the *Adjusted area* by the *Conditioned floor area for this addition* and multiply by 100. Write this number in the *Adjusted Percentage* line.

Example: The addition is 800 sf. in Climate Zone 12. The maximum allowable fenestration is 16%. You want to install a total of 175 sf. of windows and glass doors in your addition. To find your *Total Percentage* divide the *Total Area* by the *Conditioned floor area for the addition* and multiply by 100

$$175 \text{ sf.} / 800 \text{ sf.} \times 100 = 22\%.$$

Note: This percentage **must be less** than or equal to the *Allowed Percentage*. In the example, the *Total Percentage* is 22%. This is **more than** the *Percent of glass allowed in addition*.

Because 50 sf. of original glass was removed to accommodate the new addition, the 50 sf. can be subtracted from the total amount of glass being installed.

$$175 \text{ sf.} - 50 \text{ sf.} = 125 \text{ sf.}$$

Write this in the *Adjusted area*. You can now recalculate to get the new *Adjusted Percentage*.

$$125 \text{ sf.} / 800 \text{ sf.} \times 100 = 15.6\%$$

Now the *Adjusted Area* complies because it is under 16%!

If your *Adjusted Percentage* is still larger than the *Allowed Percentage*, you **must** decrease the size or number of the windows or use a different compliance approach.

Solar Heat Gain Coefficient (SHGC)

To determine whether the solar heat gain coefficient for your design meets or exceeds the minimum requirements, refer to the Table you selected for your addition. Using the column that corresponds with your Climate Zone, find the appropriate SHGC for the north, south, east, and west facing windows. This is your maximum solar heat gain coefficient and it should be placed in the *Max. Total Solar Heat Gain Coefficient* column.

The *SHGC (window alone)* should be taken from the NFRC label or from the Default Solar Heat Gain Coefficient Table on the next page and entered in the CF-1RA in *Solar Heat Gain Coefficient (window alone)* column.

If any exterior shading devices will be used they should be listed in the *Exterior Shading Devices* column (e.g., louvered sunscreens, roll-down awnings). There is no credit for overhangs. To gain credit for your exterior shading device, proceed to **Form SA** and calculate the SHGC for the window and exterior shading device combination. This value should be entered in the *Total SHGC Installed* column on the CF-1RA.

The *Total SHGC Installed* column should reflect the SHGC calculated on Form SA if there are exterior shading devices, or the *Solar Heat Gain Coefficient (window alone)* on the CF-1RA if there are no exterior shades.

Example: Using Table 2, Climate Zone 12, the east and west windows must have a solar heat gain coefficient of 0.40.

To meet the 0.40 coefficient in our sample addition, we used a window with a SHGC of 0.65 and Exterior Sunscreens with a SHGC of 0.30. From the Form SA the SHGC for this combination is 0.28.



DEFAULT SOLAR HEAT GAIN COEFFICIENT

<u>Frame Type</u>	<u>Product</u>	<u>Glazing</u>	Total Window SHGC	
			<u>Single Pane</u>	<u>Double Pane</u>
Metal	Operable	Uncoated	0.80	0.70
Metal	Fixed	Uncoated	0.83	0.73
Metal	Operable	Tinted	0.67	0.59
Metal	Fixed	Tinted	0.68	0.60
Metal, Thermal Break	Operable	Uncoated	0.72	0.63
Metal, Thermal Break	Fixed	Uncoated	0.78	0.69
Metal, Thermal Break	Operable	Tinted	0.60	0.53
Metal, Thermal Break	Fixed	Tinted	0.65	0.57
Non-Metal	Operable	Uncoated	0.74	0.65
Non-Metal	Fixed	Uncoated	0.76	0.67
Non-Metal	Operable	Tinted	0.60	0.53
Non-Metal	Fixed	Tinted	0.63	0.55

SHGC = Solar Heat Gain Coefficient

HVAC SYSTEM

When any conditioned space is added to a home, load calculations may be required by the local building department to determine if your HVAC system can adequately heat and cool the new space. If your local building department requires these calculations, one of the following methods must be used: ASHRAE's Handbook of Fundamentals, SMACNA's 'Manual J', and ACCA's method. These calculations can be performed by the HVAC contractor or engineer when you get estimates for your new HVAC system.

SPACE HEATING

Electric resistance or strip heating may not be used with this compliance approach. To use this type of heating you must use an

alternative compliance approach. Contact the Energy Hotline for more information. It is recommended that you call the Energy Hotline at (916) 654-5106 or (800) 772-3300 before you actually purchase your heating equipment to make sure it is certified. Be sure to have the heater model number available when you call.

If you are installing a new central air source heat pump, the minimum **Heating Seasonal Performance Factor (HSPF)** is 6.6 for package units and 6.8 for split systems.

You can verify the HSPF by looking for the yellow EnergyGuide label found directly on the heat pump or in manufacturer's literature.



On most types of systems, an **automatic dual setback thermostat** is also necessary for this compliance method. A dual setback thermostat is one that can automatically be set or programmed to change the thermostat temperature setting at least twice during a 24-hour period, such as during the night and again during the day when no one is home.

The automatic dual setback thermostat requirement does not apply to gravity gas wall heaters, gravity floor heaters, gravity room heaters, room air conditioners, and room air conditioner heat pumps.

The following Table shows the minimum required efficiencies for space heating equipment.

Non-Ducted, Non-Central Gas-Fired Heating Equipment

Gas Fired Wall Furnaces, Floor Furnaces and Room Heaters			AFUE
Wall	fan type	up to 42,000 Btu/hour	73%
		over 42,000 Btu/hour	74%
	gravity type	up to 10,000 Btu/hour	59%
		over 10,000 Btu/hour up to 12,000 Btu/hour	60%
		over 12,000 Btu/hour up to 15,000 Btu/hour	61%
		over 15,000 Btu/hour up to 19,000 Btu/hour	62%
		over 19,000 Btu/hour up to 27,000 Btu/hour	63%
		over 27,000 Btu/hour up to 46,000 Btu/hour	64%
		over 46,000 Btu/hour	65%
	gravity type	up to 37,000 Btu/hour	56%
		over 37,000 Btu/hour	57%
Room	gravity type	up to 18,000 Btu/hour	57%
		over 18,000 Btu/hour up to 20,000 Btu/hour	58%
		over 20,000 Btu/hour up to 27,000 Btu/hour	63%
		over 27,000 Btu/hour up to 46,000 Btu/hour	64%
		over 46,000 Btu/hour	65%

SPACE COOLING

If you are not installing a new air conditioner, skip this section. However, you **must** put a note on the CF-1RA that you will be using the existing unit or that this item is “not applicable.”

If you are installing a new air conditioner, you must find one that meets the minimum **Seasonal Energy Efficiency Ratio (SEER)**. You should check with the Energy Commission’s Energy Hotline to verify the efficiency of the model number you have selected. You may also verify the efficiency on your new air conditioner by checking the yellow EnergyGuide label on the unit.

The dual setback thermostat as discussed in the **Space Heating** section still applies to air conditioners, with the exception of room air conditioners and room air conditioner heat pumps.

The following Table shows the minimum required efficiencies for space heating equipment.

Appliance	SEER
Central Air Conditioners	
Split System	10.0
Single Package	9.7
Central Air Source Heat Pumps	
Split System	10.0
Single Package	9.7



WATER HEATING

If you are not installing a new water heater, skip this section. However, you **must** put a note on the CF-1RA that you are not installing a new unit.

If you are installing an additional water heater, the standards require that the energy budget be met. This means that you must choose a water heater and distribution system combination that correlates to a “Y” in Table 4.

If you are replacing an existing water heater, only mandatory measures as shown on the MF-1R apply.

Table 4

Water Heating Systems that Meet Package Requirements ¹								
Water		Energy Factor	Distribution ³			Recirc Systems ³		
Heater Type ²	CZ		STD	HWR	Pipe Insul	No Ctrl	Temp/Timer	Demd/Temp
SG50	All	0.53	Y ⁴	Y	Y	N ⁴	N	Y
		0.63	Y	Y	Y	N	Y	Y
		0.73	Y	Y	Y	Y	Y	Y
SG75	All	0.48	N	Y	N	N	N	N
		0.58	Y	Y	Y	N	N	Y
		0.68	Y	Y	Y	Y	Y	Y
SE	All	0.87	N	N	N	N	N	N
		0.93	N	N	N	N	N	N
IG ⁵	All	0.80	Y	Y	Y			
IE H	All 1,14	0.93	N	N				
		1.80	Y	Y	Y	N	N	Y
		2.20	Y	Y	Y	N	Y	Y
		2.60	Y	Y	Y	Y	Y	Y
HP 2-5,12		1.80	Y	Y	Y	N	N	Y
		2.20	Y	Y	Y	N	Y	Y
		2.60	Y	Y	Y	Y	Y	Y
HP 6-11 & 13, 15		1.80	Y	Y	Y	N	N	Y
		2.20	Y	Y	Y	Y	Y	Y
		2.60	Y	Y	Y	Y	Y	Y
HP 16		1.80	N	N	N	N	N	N
		2.20	N	N	N	N	N	N
		2.60	Y	Y	Y	N	N	Y

NOTES TO TABLE 4:

- The water-heating systems listed here have been pre-calculated to determine compliance with the water-heating budgets (see Note 4). **NOTE: All storage tank water heaters with less than 0.58 energy factor are assumed to have R-12 external tank insulation. This insulation is a mandatory requirement for storage tank water heaters with an energy factor between 0.53 and 0.579.**

2. Water heater types:

- SG50 = Storage gas 50 gallons or less
- SG75 = Storage gas, 51 to 75 gallons, less than 75,000 Btu/hr input
- HP = Heat Pump, 50 gallons or less
- IG = Instantaneous Gas, pilot loss may not exceed 600 Btu/hr
- SE = Storage electric, 50 gallons or less.

Note that compliance of heat pump water heaters varies by climate zone.

3. Distribution Systems:

- STD = Standard
- HWR = Hot water recovery
- POU = Point of use
- Pipe Insul = Pipe insulation credit

Recirculation:

- NoCtrl = Recirculation system with no controls
- Temp/Timer = Recirculation system with either temperature or timer controls
- Demand/Temp = Recirculation system with either demand controls, or with a combination time/temperature control.

Pipe insulation is required on the entire length of recirculating piping, except when equipped with demand control.

(Footnotes continue on page 14)



4. Waterheater systems listed with a "Y" meet the waterheating budget and must be installed with the applicable efficiency and distribution devices used to receive credits. Water heater systems listed with an "N" do not meet standard waterheating budget.
 5. For instantaneous gas water heaters (IG), the value listed in the Energy Factor column is the Recovery Efficiency
-

LIGHTING

This section is not listed in the Tables but is required if you are adding a bathroom or a kitchen (see MF-1R).

Kitchen Lighting

The Energy Standards require a luminaire with an efficacy of at least 40 lumens/watt in kitchens (fluorescent fixtures meet this requirement, incandescents do not). This lighting must provide **general lighting** for the whole space and be controlled by the most accessible switch(es) in the kitchen.

General lighting is lighting designed to provide a substantially uniform level of light distribution throughout a space. This can be achieved by light fixtures in the ceiling or around the perimeter of the room.

Bathroom Lighting

The Energy Standards require that each room with a shower or bathtub must have at least one luminaire with an efficacy of at least 40 lumens/watt (fluorescent fixtures meet this requirement, incandescents do not). These lights must be switched at the entrance to the room.

As an alternative, both of the following are required:

1. A luminaire with an efficacy of at least 40 lumens/watt (fluorescent fixtures meet this requirement, incandescents do not) must be installed in another room with utilitarian functions such as a laundry room, utility room, or garage; **and**
2. All permanently mounted outside lighting must either have an efficacy of at least 40 lumens/watt (fluorescent fixtures meet this requirement, incandescents do not) or equipped with a motion sensor.

General

Fluorescent lights must be hard wired and cannot contain a medium base incandescent (standard light bulb) lamp socket. This is to prevent the possibility of incandescent light bulbs being installed at a later date. This light must be on a separate switch from all other lighting in the room.

All incandescent lighting fixtures recessed into insulated ceilings must be approved for zero-clearance insulation cover (I.C.) by Underwriters Laboratories or some other testing/rating organization recognized by the International Conference of Building Officials (ICBO). This allows safe installation of insulation over the top of the fixture, eliminating the need to cut holes in the insulation, which significantly reduces the insulation's effectiveness.



Step 5:

Complete the compliance forms required by your building department

The following forms must be completed and submitted to your building department. The forms show what energy saving measures you will be installing in your addition.

Certificate of Compliance (CF-1RA)

This form is used to summarize all energy conservation features and energy efficient devices used to comply with the energy code.

All of the values from your selected table must be entered on this form. It must be signed by the designer or person responsible for construction as well as the building owner.

This form must be placed on the plans and submitted to the building department for review.

Solar Heat Gain Coefficient Worksheet (Form SA)

This form helps you combine the Solar Heat Gain Coefficient (SHGC) for the window alone with the SHGC of the exterior shades. It is required if you need exterior shades to meet the SHGC value.

Mandatory Measures Checklist (MF-1R)

All mandatory measures must be installed at, or better than, the values listed on this form. You must complete and submit this form to the building department.

In the column labeled *Designer*, you must initial all mandatory measures that apply to your project in the space provided. This indicates that you are aware of the **minimum** requirements and that you will have them installed.

Those measures that are not part of your project must be marked Not Applicable or N/A. All applicable measures should be clearly marked on the plans so that the builder or installer is fully aware of these issues.



Step 6:

Submit your completed compliance forms to your building department

Once your building plans are ready and your energy compliance forms are completed, take them to your local building department. Building department staff will check the forms and verify that your energy design

meets the energy efficiency requirements of the California Energy Code. During required inspections of your addition, the building department will verify that each energy efficient feature has been installed.



CERTIFICATE OF COMPLIANCE: RESIDENTIAL (page 1 of 2) **CF-1RA****Prescriptive Package for Additions****Climate Zone:** 12

Smith's Addition

July 1, 1999

Project Title1516 9th Street**Date****Project Address**

Chris Savarino

1-800-772-3300

Documentation Author**Telephone**

Building Permit #

Plan Check / Date

Plan Check / Date

Floor Construction Type: Slab / Raised Floor (circle one)**Enforcement Agency Use Only****Conditioned floor area for the addition:** 800 sq. ft.**Building Shell Insulation**

Component Type	Insulation R-Value		Location / Comments (attic, garage, typical, etc.)
	Min.	Installed	
Ceiling	38	38	Bedroom
Wall	13	13	Bedroom
Slab Edge			
Floor			

Windows and Glass Doors

Orientation Type	Area (sq. ft)	Window Type (single pane, dual pane, etc...)	U-Value		Solar Heat Gain Coefficient (window alone)	Exterior Shading Devices (Shade screens, shutters, etc...)	Total Solar Heat Gain Coefficient	
			Max.	Installed			Max.	Installed
North	50	Dual pane	0.65	0.60	0.65	None	n/a	n/a
East	43	Dual pane	0.65	0.60	0.65	Exterior Sunscreens	0.40	0.28
South								
West	82	Dual pane	0.65	0.60	0.65	Exterior Sunscreens	0.40	0.28
Skylight								

Total Area: 175 **Total Percentage:** 22% (total window area / conditioned floor area)**Adjusted area calculation**

Include only window areas that were removed from a wall that was either removed or altered in order to accommodate the addition.

Area removed	50	
Adjusted Window Area	125	(total window area – window area removed)
Adjusted Percentage	15.6%	(adjusted window area / conditioned floor area)
Allowed Percentage	16%	(from Tables 2 or 3--Percent of glass allowed)

NOTE: The adjusted percentage less than or equal to the allowed percentage.



CERTIFICATE OF COMPLIANCE: RESIDENTIAL (page 2 of 2) **CF-1RA**

Smith's Addition

July 1, 1999

Project Title**Date****HVAC Systems**

Heating Equipment Type (furnace, heat pump, wall heater, etc.)	Efficiency (AFUE or HSPF)	Setback Thermostat	Configuration (split or package)
	Min / Installed		
Fan Type Wall Heater	73% / 75%	Yes	n/a
Cooling Equipment Type (air conditioner, heat pump, wall air conditioner)	Efficiency (SEER, EER, etc.)	Setback Thermostat	Configuration (split or package)
	Min / Installed		
Existing			

Water Heating System

Water Heater Type (gas, electric, heat pump, etc.)	Distribution Type (standard, recirculating, etc.)	Number Installed	Rated Input (kW or Btu/hr)	Volume (gallons)	Energy Factor or Recovery Efficiency *	Standby Loss *	External Tank Insulation (R-Value)
Gas	Recirculating	1	n/a	50	0.73	n/a	n/a

- For small gas storage water heaters (rated inputs of less than or equal to 75,000 Btu/hr), electric resistance, and heat pump water heaters, use Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Rated Input, Recovery Efficiency and Standby Loss. For instantaneous gas water heaters, list rated input and recovery efficiencies.

Special Features and Remarks**Compliance Statement**

This certificate of compliance lists the building features and performance specifications needed to comply with Title 24, Parts 1 and 6 of the California Code of Regulations, and the administrative regulations to implement them. This certificate has been signed by the individual with overall design responsibility.

Designer or Owner

Name: Dean Samuelson
Title/Firm: California Energy Commission
Address: 1516 9th Street
Sacramento, CA 95814
Telephone: 1-800-772-3300
Lic. #: _____

Dean Samuelson 7-01-99
(signature) (date)

Documentation Author

Name: Chris Savarino
Title/Firm: California Energy Commission
Address: 1516 9th Street
Sacramento, CA 95814
Telephone: 1-800-772-3300

Chris Savarino 7-01-99
(signature) (date)

Enforcement Agency

Name: _____
Title: _____
Agency: _____
Telephone: _____

(signature / stamp) (date)



Items 1 through 4 must be completed for glazing/shading combinations by using the Default Table for Fenestration Products (Table S-1); NFRC labels, or Solar Heat Gain Coefficients Used for Exterior Shading Attachments (Table S-2) for the specific conditions indicated in 1a, 1b, or 3 below.

General Information

1a. For Fenestration Products w/NFRC testing and labels:

SHGC_{fen} = _____

OR

1b. For Fenestration Products without NFRC testing and labels (Table S-1):

SHGC_{fen} = 0.65

1c. Frame Type
Non-Metal

metal, non-metal,
metal w/thermal break

1d. Product Type
Operable

operable/fixed

1e. Glazing Type
Uncoated

(visibly) tinted
uncoated (not visibly tinted)

1f. Single/Double Pane
Double Pane

single pane/double pane

2. Skylight

("Skylights" must be mounted on a surface of pitch less than or equal to 1 in 12 for prescriptive compliance)

(Y/N) No

Combined Exterior Shade with Fenestration

3. SHGC_{Exterior Shade}: 0.30

(If no exterior shade, assume standard bug screens, SHGC_{Exterior Shade} = 0.76 for ordinary windows. This requirement does not apply to skylights where SHGC_{Exterior Shade} is assumed to be 1.00. If another exterior shade is substituted for bug screens, use one of the values from Table S-2

Exterior Shade Type: Exterior Sunscreens

4.
$$\left[\left(\frac{0.65}{SHGC_{max}} \times 0.2875 \right) + 0.75 \right] \times \frac{0.30}{SHGC_{min}} = \boxed{0.28}$$

Total SHGC Installed

Where:

SHGC_{max} = Larger of (#1a or #1b) or #3

SHGC_{min} = Smaller of (#1a or #1b) or #3

Table S-1

DEFAULT FENESTRATION SOLAR HEAT GAIN COEFFICIENT

Frame Type	Product	Glazing	Total Window SHGC	
			Single Pane	Double Pane
Metal	Operable	Uncoated	0.80	0.70
Metal	Fixed	Uncoated	0.83	0.73
Metal	Operable	Tinted	0.67	0.59
Metal	Fixed	Tinted	0.68	0.60
Metal, Thermal Break	Operable	Uncoated	0.72	0.63
Metal, Thermal Break	Fixed	Uncoated	0.78	0.69
Metal, Thermal Break	Operable	Tinted	0.60	0.53
Metal, Thermal Break	Fixed	Tinted	0.65	0.57
Non-Metal	Operable	Uncoated	0.74	0.65
Non-Metal	Fixed	Uncoated	0.76	0.67
Non-Metal	Operable	Tinted	0.60	0.53
Non-Metal	Fixed	Tinted	0.63	0.55

SHGC = Solar Heat Gain Coefficient



Table S-2

**Solar Heat Gain Coefficients Used for Exterior Shading
Attachments for Form S and Computer Performance Methods 1,2**

Exterior Shading Device³	w/Single Pane Clear Glass & Metal Framing⁴
1) Standard Bug Screens	0.76
2) Exterior Sunscreens with weave 53*16/inch	0.30
3) Louvered Sunscreens w/louvers as wide as openings	0.27
4) Low Sun Angle (LSA) Louvered Sunscreens	0.13
5) Roll-down Awning	0.13
6) Roll Down Blinds or Slats	0.13
7) None (for skylights only)	1.00

1. These values may be used on line 9 of the Solar Heat Gain Coefficient (SHGC) Worksheet (form SA) to calculate exterior shading with other glazing types and combined interior and exterior shading with glazing.
2. Exterior operable awnings (canvas, plastic or metal), except those that roll vertically down and cover the entire window, should be treated as overhangs for purposes of compliance with the Standards.
3. Standard bug screens must be assumed for all fenestration unless replaced by other exterior shading attachments. The solar heat gain coefficient listed for bug screens is an area-weighted value that assumes that the screens are only on operable windows. The solar heat gain coefficient of any other exterior shade screens applied only to some window areas must be area-weighted with the solar heat gain coefficient of standard bug screens for all other glazing. Different shading conditions may also be modeled explicitly in the computer performance method.



CERTIFICATE OF COMPLIANCE: RESIDENTIAL (page 1 of 2) **CF-1RA**

Prescriptive Package for Additions

Climate Zone: _____

Project Title _____

Date _____

Project Address _____

Documentation Author _____

Telephone _____

Building Permit # _____

Plan Check / Date _____

Plan Check / Date _____

Floor Construction Type: **Slab / Raised Floor** (circle one)

Enforcement Agency Use Only

Conditioned floor area for the addition: _____ sq. ft.

Building Shell Insulation

Component Type	Insulation R-Value Min. / Installed	Location / Comments (attic, garage, typical, etc.)
Ceiling	_____ / _____	_____
Wall	_____ / _____	_____
Slab Edge	_____ / _____	_____
Floor	_____ / _____	_____

Windows and Glass Doors

Orientation Type	Area (sq. ft)	Window Type (single pane, dual pane, etc...)	U-Value Max. / Installed	Solar Heat Gain Coefficient (window alone)	Exterior Shading Devices (Shade screens, shutters, etc...)	Total Solar Heat Gain Coefficient Max. / Installed
North	_____	_____	_____ / _____	_____	_____	_____ / _____
East	_____	_____	_____ / _____	_____	_____	_____ / _____
South	_____	_____	_____ / _____	_____	_____	_____ / _____
West	_____	_____	_____ / _____	_____	_____	_____ / _____
Skylight	_____	_____	_____	_____	_____	_____

Total Area: _____ **Total Percentage:** _____ (total window area / conditioned floor area)

Adjusted area calculation

Include only window areas that were removed from a wall that was either removed or altered in order to accommodate the addition.

Area removed _____
Adjusted Window Area _____ (total window area – window area removed)
Adjusted Percentage _____ (adjusted window area / conditioned floor area)
Allowed Percentage _____ (from Tables 2 or 3--Percent of glass allowed)

NOTE: The adjusted percentage must be less than or equal to the allowed percentage.



CERTIFICATE OF COMPLIANCE: RESIDENTIAL (page 2 of 2) **CF-1RA**

Project Title _____

Date _____

HVAC Systems

Heating Equipment Type (furnace, heat pump, wall heater, etc.)	Efficiency (AFUE or HSPF)	Setback Thermostat	Configuration (split or package)
	Min / Installed		
_____	_____ / _____	_____	_____
_____	_____ / _____	_____	_____
Cooling Equipment Type (air conditioner, heat pump, wall air conditioner)	Efficiency (SEER, EER, etc.)	Setback Thermostat	Configuration (split or package)
	Min / Installed		
_____	_____ / _____	_____	_____
_____	_____ / _____	_____	_____

Water Heating System

Water Heater Type (gas, electric, heat pump, etc.)	Distribution Type (standard, recirculating, etc.)	Number Installed	Rated Input (kW or Btu/hr)	Volume (gallons)	Energy Factor or Recovery Efficiency *	Standby Loss * (%)	External Tank Insulation (R-Value)
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

- For small gas storage water heaters (rated inputs of less than or equal to 75,000 Btu/hr), electric resistance, and heat pump water heaters, use Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Rated Input, Recovery Efficiency and Standby Loss. For instantaneous gas water heaters, list rated input and recovery efficiencies.

Special Features and Remarks

Compliance Statement

This certificate of compliance lists the building features and performance specifications needed to comply with Title 24, Parts 1 and 6 of the California Code of Regulations, and the administrative regulations to implement them. This certificate has been signed by the individual with overall design responsibility.

Designer or Owner

Name: _____
Title/Firm: _____
Address: _____

Telephone: _____
Lic. #: _____

(signature)

(date)

Documentation Author

Name: _____
Title/Firm: _____
Address: _____

Telephone: _____

(signature)

(date)

Enforcement Agency

Name: _____
Title: _____
Agency: _____
Telephone: _____

(signature / stamp)

(date)



Items 1 through 4 must be completed for glazing/shading combinations by using the Default Table for Fenestration Products (Table S-1); documented manufacturer's data for labeled fenestration products, or Solar Heat Gain Coefficients Used for Exterior Shading Attachments (Table S-2) for the specific conditions indicated in 1a, 1b, or 3 below.

General Information

1a. For Fenestration Products w/NFRC testing and labels: $SHGC_{fen} =$ _____

OR

1b. For Fenestration Products without NFRC testing and labels (Table S-1): $SHGC_{fen} =$ _____

1c. Frame Type

1d. Product Type

1e. Glazing Type

1f. Single/Double Pane

metal, non-metal,
metal w/thermal break

operable/fixed

(visibly) tinted
uncoated (not visibly tinted)

single pane/double pane

2. Skylight (Y/N) _____

("Skylights" must be mounted on a surface of pitch less than or equal to 1 in 12 for prescriptive compliance)

Combined Exterior Shade with Fenestration

Exterior Shade Type: _____

3. $SHGC_{Exterior\ Shade} =$ _____

(If no exterior shade, assume standard bug screens, $SHGC_{Exterior\ Shade} = 0.76$ for ordinary windows. This requirement does not apply to skylights where $SHGC_{Exterior\ Shade}$ is assumed to be 1.00. If another exterior shade is substituted for bug screens, use one of the values from Table S-2

4. $[(\text{_____} \times 0.2875) + 0.75] \times \text{_____} = \text{_____}$ Where:
 $SHGC_{max}$ $SHGC_{min}$ Total SHGC Installed $SHGC_{max} =$ Larger of (#1a or #1b) or #3
 $SHGC_{min} =$ Smaller of (#1a or #1b) or #3

Table S-1

DEFAULT FENESTRATION SOLAR HEAT GAIN COEFFICIENT

Frame Type	Product	Glazing	Total Window SHGC	
			Single Pane	Double Pane
Metal	Operable	Uncoated	0.80	0.70
Metal	Fixed	Uncoated	0.83	0.73
Metal	Operable	Tinted	0.67	0.59
Metal	Fixed	Tinted	0.68	0.60
Metal, Thermal Break	Operable	Uncoated	0.72	0.63
Metal, Thermal Break	Fixed	Uncoated	0.78	0.69
Metal, Thermal Break	Operable	Tinted	0.60	0.53
Metal, Thermal Break	Fixed	Tinted	0.65	0.57
Non-Metal	Operable	Uncoated	0.74	0.65
Non-Metal	Fixed	Uncoated	0.76	0.67
Non-Metal	Operable	Tinted	0.60	0.53
Non-Metal	Fixed	Tinted	0.63	0.55

SHGC = Solar Heat Gain Coefficient



Table S-2

**Solar Heat Gain Coefficients Used for Exterior Shading
Attachments for Form S and Computer Performance Methods ^{1,2}**

Exterior Shading Device³	w/Single Pane Clear Glass & Metal Framing⁴
1) Standard Bug Screens	0.76
2) Exterior Sunscreens with weave 53*16/inch	0.30
3) Louvered Sunscreens w/louvers as wide as openings	0.27
4) Low Sun Angle (LSA) Louvered Sunscreens	0.13
5) Roll-down Awning	0.13
6) Roll Down Blinds or Slats	0.13
7) None (for skylights only)	1.00

1. These values may be used on line 9 of the Solar Heat Gain Coefficient (SHGC) Worksheet (form SA) to calculate exterior shading with other glazing types and combined interior and exterior shading with glazing.
2. Exterior operable awnings (canvas, plastic or metal), except those that roll vertically down and cover the entire window, should be treated as overhangs for purposes of compliance with the Standards.
3. Standard bug screens must be assumed for all fenestration unless replaced by other exterior shading attachments. The solar heat gain coefficient listed for bug screens is an area-weighted value that assumes that the screens are only on operable windows. The solar heat gain coefficient of any other exterior shade screens applied only to some window areas must be area-weighted with the solar heat gain coefficient of standard bug screens for all other glazing. Different shading conditions may also be modeled explicitly in the computer performance method.



MANDATORY MEASURES CHECKLIST: RESIDENTIAL (Page 1 of 2) MF-1R

Note: Lowrise residential buildings subject to the Standards must contain these measures regardless of the compliance approach used.

Items marked with an asterisk (*) may be superseded by more stringent compliance requirements listed on the Certificate of Compliance. When this checklist is incorporated into the permit documents, the features noted shall be considered by all parties as minimum component performance specifications for the mandatory measures whether they are shown elsewhere in the documents or on this checklist only.

Instructions: Check or initial applicable boxes when completed or enter N/A if not applicable.

DESCRIPTION	DESIGNER	ENFORCEMENT
Building Envelope Measures:		
* §150(a): Minimum R-19 ceiling insulation.		
§150(b): Loose fill insulation manufacturer's labeled R-Value.		
* §150(c): Minimum R-13 wall insulation in wood framed walls or equivalent U-value in metal frame walls (does not apply to exterior mass walls).		
* §150(d): Minimum R-13 raised floor insulation in framed floors.		
§150(l) : Slab edge insulation - water absorption rate no greater than 0.3%, water vapor transmission rate no greater than 2.0 perm/inch.		
§118: Insulation specified or installed meets insulation quality standards. Indicate type and form.		
§116-17: Fenestration Products, Exterior Doors, and Infiltration/Exfiltration Controls <ol style="list-style-type: none"> Doors and windows between conditioned and unconditioned spaces designed to limit air leakage. Fenestration products (except field-fabricated) have label with certified U-value, certified Solar Heat Gain Coefficient (SHGC), and infiltration certification. Exterior doors and windows weatherstripped; all joints and penetrations caulked and sealed. 		
§150(g): Vapor barriers mandatory in Climate Zones 14 and 16 only.		
§150(f): Special infiltration barrier installed to comply with § 151 meets Commission quality standards.		
§150(e): Installation of Fireplaces, Decorative Gas Appliances and Gas Logs. <ol style="list-style-type: none"> Masonry and factory-built fireplaces have: <ol style="list-style-type: none"> Closeable metal or glass door Outside air intake with damper and control Flue damper and control No continuous burning gas pilot lights allowed. 		
Space Conditioning, Water Heating and Plumbing System Measures:		
§110-§113: HVAC equipment, water heaters, showerheads and faucets certified by the Commission.		
§150(h): Heating and/or cooling loads calculated in accordance with ASHRAE, SMACNA or ACCA.		
§150(I): Setback thermostat on all applicable heating and/or cooling systems.		
§150(j): Pipe and tank insulation <ol style="list-style-type: none"> Storage gas water heaters rated with an Energy Factor less than 0.58 must be externally wrapped with insulation having an installed thermal resistance of R-12 or greater. First 5 feet of pipes closest to water heater tank, non-recirculating systems, insulated (R-4 or greater) Back-up tanks for solar system, unfired storage tanks, or other indirect hot water tanks have R-12 external insulation or R-16 combined internal/external insulation. All buried or exposed piping insulated in recirculating sections of hot water systems. Cooling system piping below 55° F insulated. Piping insulated between heating source and indirect hot water tank. 		



MANDATORY MEASURES CHECKLIST: RESIDENTIAL (Page 2 of 2) MF-1R

Note: Lowrise residential buildings subject to the Standards must contain these measures regardless of the compliance approach used. Items marked with an asterisk (*) may be superseded by more stringent compliance requirements listed on the Certificate of Compliance. When this checklist is incorporated into the permit documents, the features noted shall be considered by all parties as minimum component performance specifications for the mandatory measures whether they are shown elsewhere in the documents or on this checklist only.

Instructions: Check or initial applicable boxes when completed or enter N/A if not applicable.

DESCRIPTION	DESIGNER	ENFORCEMENT
Space Conditioning, Water Heating and Plumbing System Measures: (continued)		
<p>* §150(m): Ducts and Fans</p> <ol style="list-style-type: none"> 1. All ducts and plenums constructed, installed, insulated, fastened, and sealed to comply with the ICBO 1997 UMC sections 601 and 603; ducts insulated to a minimum installed R-4.2 or ducts enclosed entirely within conditioned space. Openings shall be sealed with mastic, tape, aerosol sealant or other duct closure system that meets the applicable requirements of UL181, UL181A, or UL181B and other applicable specified tests for longevity given in §150(m).. 2. Exhaust fan systems have back draft or automatic dampers. 3. Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers. 		
<p>§114: Pool and Spa Heating Systems and Equipment.</p> <ol style="list-style-type: none"> 1. System is certified with 78% thermal efficiency, on-off switch, weatherproof operating instructions, no electric resistance heating and no pilot light. 2. System is installed with: <ol style="list-style-type: none"> a. At least 36" of pipe between filter and heater for future solar heating. b. Cover for outdoor pools or outdoor spas. 3. Pool system has directional inlets and a circulation pump time switch. 		
<p>§115: Gas fired central furnaces, pool heaters, spa heaters or household cooking appliances have no continuously burning pilot light. (Exception: Non-electrical cooking appliances with pilot < 150 Btu/hr)</p>		
Lighting Measures:		
<p>§150(k)1.: Luminaires for general lighting in kitchens shall have lamps with an efficacy of 40 lumens/watt or greater for general lighting in kitchens. This general lighting shall be controlled by a switch on a readily accessible lighting control panel at an entrance to the kitchen.</p>		
<p>§150(k)2.: Rooms with a shower or bathtub must either have at least one luminaire with lamps with an efficacy of 40 lumens/watt or greater switched at the entrance to the room or one of the alternatives to this requirement allowed in §150(k)2.; and recessed ceiling fixtures are IC (insulation cover) approved.</p>		



For more information about energy efficiency or for help with any of the information contained in the *Six Steps to an Energy Efficient Addition*, contact:

**California Energy Commission
Energy Efficiency Division
Residential Standards and Appliances Office
1516 Ninth Street, MS-25
Sacramento, CA 95814-5512**

or call:

**Energy Hotline
(800) 772-3300
(916) 654-5106
(8 am – Noon, 1 pm – 4:30 pm)**

**For California energy information,
Visit the Energy Commission's Web Site:**

<http://www.energy.ca.gov>